

# Analog Descriptor Page

*Local Station Application*

Feb 25, 1992

## Introduction

An analog descriptor is the Local Station's static database for an analog channel device. The database is organized as an array of Pascal records. The fields of this 64-byte record are used to support the full functionality of an analog channel. This page allows access to any node's analog database.

## Display layout

A ANALOG DESCRIPT 02/25/92 1107	
CHAN<0611:0502> -SE FAM<0000>	Node:Chan
NAME<GR2MID> "	Name
TITL<RF2 GRDIENT MANAUT>02/13/92	Date-of-last-change
CONV<00> Z=4,C=2,G=8,P=9	
A/D FS< 8.34 > +< 0.166 ><NRM >	
D/A FS< 18000 > +< 0.199 >	ADESC fields
ANLG CTRL <02> <A3> <B015>	
STAT INV/N<11> BIT<05AF,-->	
CONTROL DT<01,--> BIT<05AF,-->	
LIST DESCR TO :07FF LIST DATA	Listing options
ALARM FLG\$<A000>API2B---S-----	Alarm flag bits
TRIPS: 0 *RESET ALARMS	Reset local station alarms

The format is designed for fill-in-the-blanks interaction. On the second line, the node/channel is entered for the device whose analog descriptor is to be accessed; alternatively, the name can be entered on the third line. Interrupt after typing to request the current database information for that device to be displayed. The following lines include the various fields of the analog descriptor:

1. 18-character title
2. 6-character name
3. 4-character engineering units text
4. 1-byte "conversion type"
5. 4 floating point scaling constants
6. 4-byte analog control field
7. 2-byte family word
8. 4-byte associated digital status field
9. 6-byte associated digital control field

*Title text*

This 18-character text field is a short description of the channel device in addition to the name. Due to the limited size of the small screen consoles, only 14 characters of the title are displayed by the parameter page. Those selected are the 14 characters following the first *word* of the title. The first word is often used to indicate the node of the device, which is often implied in the name. In the case that associated status/control fields are used, the last 6 characters of the title text (characters 13–18) are used to store two 3-characters status state texts. In the case that two bits of associated status/control are used, the entire title is preempted, as the second bit's status text is stored in characters 6–11 of the title. So, in this case, the name alone must suffice to represent the device on the parameter page.

*Name text*

The 6-character name of a device must be unique on the network, not only within a single node. When a name is entered and the interrupt given to enter all fields into a given channel's descriptor, a broadcast request is simultaneously issued to find out whether the name already exists among the nodes of the network. If it does exist in some node, then its node/channel designation is displayed just to the left of the NAME prompt. The setting has already taken place, so at that point there is at least one duplication of the entered name. One may wish to remove the one indicated or use a different name for the channel.

*Units text*

The 4-character field is placed into the 4-byte units text field of the analog descriptor. The parameter page aligns this field if possible.

*Conversion type*

This field is a byte that includes flags that mark the channel for various special treatments with certain Data Access Table entries. Bit #1 (mask=\$02) is set to mark capture data, which is used by DAT type \$16. Bit #2 (mask=\$04) is set to mark zero-subtracted data, which is used by DAT type \$07. Bit#3 (mask=\$08) is used to mark channels which need linearization, which is used by DAT type \$06. See the document entitled "RDATA Entry Formats" for more details on this.

*Scale factors*

Four floating point constants are used for engineering units scaling. A reading, nominal or tolerance value is scaled to engineering units by using the first fullscale and offset values. The setting value is scaled using the last two fullscale and offset values. The linear formula used is:

```
eng:= Float(raw)/32768.*fScale + offset;
```

The `raw` value is the 16-bit raw data word. The value (`raw/32768`) is the

In the case of tolerance, the offset term is omitted, since a tolerance is like a difference value.

*Analog control field*

The first byte of this 4-byte field is the analog control type#. Types currently supported are:

- 00 No analog control (parameter page will not mark it with a “-”)
- 01 Datel Multibus board (obsolete)
- 02 Motor (setting value is desired reading, relative setting is #steps)
- 03 Bipolar multiplex D/A (obsolete)
- 04 Unipolar multiplex D/A (obsolete)
- 05 Memory word (accessed as two bytes)
- 06 i8253 timer (obsolete)
- 07 M6840 timer (obsolete)
- 08 1553 D/A (12-bit)—used in rack monitor
- 09 Analog Devices RTI-602 D/A board
- 0A Memory word (accessed as a word)
- 0B Message queue setting to another cpu (co-processor)
- 0C Unsigned 12-bit D/A (in short I/O space)
- 0D Burr-Brown MPV904 12-bit D/A board
- 0E 1553 D/A (16-bit)
- 0F AMD9513 timer (32-bits from pair of channels)
- 10 Memory byte (single byte no shift)
- 11 Memory byte (single byte w/shift in short I/O space)
- 12 Same channel reading word w/mask
- 13 Smart Rack Monitor analog control (12-bit)
- 14 Smart Rack Monitor analog control (16-bit)

Details of the meaning of the other 3 bytes available in the analog control field are found in the document entitled “Analog Control Types.”

*Family word*

The family word is a delta channel# used to reference another channel which is in some way related to this one. By including the appropriate delta value for a set of related channels, one can form a family of channels which is accessible from any member of the family. Listype #49 may be used to request the list of channel numbers that comprise the family to which a given channel belongs. This is more fully described in the document entitled “Related Groups of Channels.”

*Associated digital status/control*

One or two bits can be associated with an analog channel to show related status information such as on/off and allow digital control as well. This topic is more fully discussed in the document entitled “Digital Control Pulse Delays.”

values and press interrupt (or the `ESC` key) with the cursor anywhere in the range of the 7 lines following the NAME line. The program reads *all* the fields that are alterable from the screen, including the node/channel number on the second line and the name on the third line, and it encodes the information into the internal format and issues a setting to install the descriptor record into that channel's local database. (Since it reads the channel number each time, one can easily move one channel's descriptor to another channel with minor editing.) It then requests the descriptor to be read back and displays the results. The date-of-last-change, displayed on the second line, should then reflect the current date. This field is not directly settable, but it is automatically updated whenever a setting is made to any of the fields in the channel's analog descriptor.

Separate from the analog descriptor fields for a channel device, there are alarm flag bits that can be set on the next to last line of the display. This flags word is shown in hexadecimal. Single characters are shown to the right as a reminder of each bit's meaning. The current set of flag bits available for setting are:

- 15 Active (1=enabled for alarm scan)
- 14 Pattern (1=composite status word)
- 13 Inhibit (1=inhibit beam while bad)
- 12 Two times (1=require twice in succession for change-of-state)
- 11 Beam (1=alarm scan only on beam pulses)
- 10 Bypass control—used internally
- 9 Two times counter—not settable
- 8 Good/bad (1=bad)—not settable
- 7 Silent (1=inhibit sending of alarm messages)

To modify these flag bits for a given channel whose descriptor is being displayed, enter the desired hex pattern and interrupt on that line.

To facilitate the inspection of families of channels, one can interrupt under the FAM area on the display to sequence to the next channel in the family (if there is one). Note that a value of \$0000 in the family word means there is no next channel in the family.

### **Setting enable flag—important!**

When the page is entered, an internal flag is set to disabled to prevent any settings from being made accidentally while browsing. To toggle this flag to enable settings, interrupt in the `-SE` field in the middle of the second line. The response to show that the flag is enabled is `*SE`. If an attempt is made to change a descriptor without the flag enabled, the `-SE` field will flash a few times as a reminder that settings are not enabled.

introduced so the data displayed can be seen by the human eye. Incrementing beyond the maximum channel# shown on the listing line wraps to channel 0.

**Error status**

An error status code number is displayed as a single character at the end of the second line. If there are no errors, this character will be blank; otherwise, its value is displayed in inverse video. Likely values that may be displayed are:

- 8 At least one node is not responding to the request for data.

When no reply is received from a name lookup request, the same code will be shown immediately following the name field on the third line.

**Alarm info**

The last line shows the alarm trip count for the channel, which is the number of times the channel has been observed by the alarm scanning logic to change state from good to bad. This value is limited on the display to 9999.

Interrupt on the right side of this line to reset the alarms for the target node, resulting in zeroing the good/bad alarm flag bits for all analog channels and binary bits in that node. On the next alarm scan, then, every device which is in the alarm scan and in the bad state will report an alarm message. It is more usual for a host system to issue a broadcast setting to reset alarms in all nodes.

**Listing options**

Two listings of analog database entries are provided on a listing line. On the left-hand part of the line, an interrupt produces a listing of each channel's ADESC entries, just as they are shown on the page. On the right-hand part of the line, an interrupt produces a listing of the ADATA table entries (the reading, setting, nominal and tolerance values). The listing starts with the channel currently selected on the page and ends with the channel# (in hex) indicated on the listing line, which is by default set to the maximum channel# available in that node. The data for each channel is encoded into a single line, and a heading is output at the beginning that shows the target node# and the current time-of-day. The display is updated as the channels are scanned in sequence over the selected range. When a channel is accessed that is not used (meaning the name starts with a blank or a null byte, and the number of associated status bits is zero, and the analog control type is zero, and the channel is not in the alarm scan), it is skipped and omitted from the listing. The channel's data is displayed very briefly to at least give a visual hint of what's there.

The output of the serial port can be plugged into any RS-232 device, so that one can archive the contents of a node's local database in this way. It could be stored on a host's disk or captured by a Macintosh terminal emulator program or

listing process, merely interrupt again on the listing line while it is active.

Here is an example of the two forms of listing output:

### Analog descriptors

```

NODE=0611  ANALOG  DESCRIPT 02/25/92 1254
CHAN#  NAME    TITLE      .... UNIT  ANLG CTRL  CVT  ADFS  OFFS  DAFS  OFFS  FMLY  DATE  DIGITAL
STATUS/CONTROL
:0500 IN2PHS  T2-1  INTERTKMANAUT V    00 .. .... 00  10    0    0    0          02/10/92 11 05AB,-- 01,--
05AB,--
:0501 GR2LO   RF2  PICKUP LOOP #1 NRM  00 .. .... 08  8.34  0.166  10    0.199          01/15/92 00
:0502 GR2MID  RF2  GRDIENT MANAUT NRM  02 A3 B015 08  8.34  0.166 18000  0.199          02/13/92 11 05AF,-- 01,--
05AF,--
:0503 GR2HI   RF2  PICKUP LOOP #3 NRM  00 .. .... 08  8.34  0.166  0    0.199          01/15/92 00
:0504 PA2F    RF2  PA FWD      CBR  MW   00 .. .... 09 31.15  0    0    0.265          02/14/92 11 0515,-- 84,--
0595,--
:0505 PA2R    RF2  PA REV POWER  MW   00 .. .... 09 22.61  0    0    0.24           01/15/92 00
:0506 DR2F    RF2  DRVR FWD POWER KW   00 .. .... 09 831    0    0    0.215          01/15/92 00
:0507 DR2R    RF2  DRVR REV POWER KW   00 .. .... 09 309    0    0    0.291          01/15/92 00
:0508 AD2CK8  RF2  A/D ZERO CHK 8  V    00 .. .... 00  10    0    0    0           01/15/92 00
:0509 AD2CK9  RF2  A/D ZERO CHK 9  V    00 .. .... 00  10    0    0    0           01/15/92 00
:050A LL2F    RF2  LL FWD POWER  W     00 .. .... 09 18.12  0    0    0.245          01/15/92 00
:050B LL2R    RF2  LL REV POWER  W     00 .. .... 09 23.53  0    0    0.337          01/15/92 00
:050C IPA12F  RF2  IPA1 FWD PWR  W     00 .. .... 09 2144  0    0    0.307          01/15/92 00
:050D IPA12R  RF2  IPA1 REV PWR  W     00 .. .... 09 1517  0    0    0.174          01/15/92 00
:050E IPA22F  RF2  IPA2 FWD PWR  KW   00 .. .... 09 19.5   0    0    0.233          01/15/92 00
:050F IPA22R  RF2  IPA2 REV PWR  KW   00 .. .... 09 20.28  0    0    0.253          01/15/92 00
:0510 PH2ADJ  RF2  PHASE ADJUST  DEG  02 A3 B013 00  400   0    2500  0           01/30/92 00
:0511 TU2POS  RF2  LOW      HGH   IN   00 .. .... 00  4     0    0    0           02/11/92 12 050A,09 00,00
0500,00
:0512 RF2LML  RF2  LOSS MON LOWER V    00 .. .... 00  10    0    0    0           01/15/92 00
:0513 RF2LMU  RF2  LOSS MON UPPER V    00 .. .... 00  10    0    0    0           01/15/92 00
:0514 TO2IN   T2  TOROID IN      MA    00 .. .... 04 100   0    0    0           01/15/92 00
:0515 TO2OUT  T2  TOROID OUT     MA    00 .. .... 04 100   0    0    0           01/15/92 00
:0516 TK2IPL  TK2  VIPPS2 LEE     TOR   00 .. .... 00  10    0    0    0           01/15/92 00
:0517 TK2IPH  TK2  VIPPS2 HEE     TOR   00 .. .... 00  10    0    0    0           01/15/92 00
:0518 MD2IV   RF2  MOD INPUT VLTS V    00 .. .... 00  10    0    0    0           01/15/92 00
:0519 MD2OV   RF2  MOD OUTPUT VLT KV   00 .. .... 00 100   0    0    0           01/15/92 00
:051A MD2OI   RF2  MOD OUTPUT CUR  A    00 .. .... 00 1000  0    0    0           01/15/92 00
:051B DR2SV   RF2  DR SCREEN VOLT V    00 .. .... 00 4000  0    0    0           01/15/92 00
:051C RF2HV   RF2  HI VLTS  ONOFF KV   00 .. .... 00 100   0    0    0           02/10/92 11 0516,-- 86,--
0597,--
:051D RF2PAI  RF2  7835 FIL. CURR  A    00 .. .... 00 10000  0    0    0           01/15/92 00
:051E DR2PAV  RF2  4616 FIL. VOLT V    00 .. .... 00  10    0    0    0           01/15/92 00
:0520 QPS201  T2  QUAD PS1    RST  A    13 A3 0200 00 -312.5  0    312.5  0           02/11/92 11 0518,-- 84,--
0594,--
:0521 QPS202  T2  QUAD PS #2      A    13 A3 0201 00 -312.5  0    312.5  0           01/30/92 00
:0522 QPS203  T2  QUAD PS #3      A    13 A3 0202 00 -312.5  0    312.5  0           01/30/92 00
:0523 QPS204  T2  QUAD PS #4      A    13 A3 0203 00 -312.5  0    312.5  0           01/30/92 00
:0524 QPS205  T2  QUAD PS #5      A    13 A3 0204 00 -312.5  0    312.5  0           01/30/92 00
:0525 QPS206  T2  QUAD PS #6      A    13 A3 0205 00 -312.5  0    312.5  0           01/30/92 00
:0526 QPS207  T2  QUAD PS #7      A    13 A3 0206 00 -312.5  0    312.5  0           01/30/92 00
:0527 QPS208  T2  QUAD PS #8      A    13 A3 0207 00 -312.5  0    312.5  0           01/30/92 00

```

### Analog data

```

NODE=0611  ANALOG  DESCRIPT 02/25/92 1255
CHAN#  NAME    TITLE      .... UNIT  READNG SETTING  NOMINL  TOLRNC  AFLG  TRIP
:0500 IN2PHS  T2-1  INTERTKMANAUT V    -0.0012      0    0.08  3400  0
:0501 GR2LO   RF2  PICKUP LOOP #1 NRM  -0.002      0.981  1    3400  0
:0502 GR2MID  RF2  GRDIENT MANAUT NRM  0.0041      0.9789 0.0499 3400  0
:0503 GR2HI   RF2  PICKUP LOOP #3 NRM  0.0021      0.983  1    3400  0
:0504 PA2F    RF2  PA FWD      CBR  MW   0.0124      2.1655 0    0400  0
:0505 PA2R    RF2  PA REV POWER  MW   0.0062      0.1028 0.1649 1400  0
:0506 DR2F    RF2  DRVR FWD POWER KW   0.3297      174.96 12.097 3400  0
:0507 DR2R    RF2  DRVR REV POWER KW   0.1226      0.9524 0.7921 0400  0
:0508 AD2CK8  RF2  A/D ZERO CHK 8  V    0.0055      0    0    0000  0
:0509 AD2CK9  RF2  A/D ZERO CHK 9  V    0.0043      0    0    0000  0
:050A LL2F    RF2  LL FWD POWER  W     0.01        4.5648 0.9998 0400  0
:050B LL2R    RF2  LL REV POWER  W     0.0072     -0.0043 0.1996 0400  0
:050C IPA12F  RF2  IPA1 FWD PWR  W     0.9814      351.36 24.929 0400  0
:050D IPA12R  RF2  IPA1 REV PWR  W     0.6944      2.5462 2.4999 0400  0

```

:0515	TO2OUT	T2	TOROID	OUT	MA	0	-0.0336	0	0	0000	0
:0516	TK2IPL	TK2	VIPPS2	LEE	TOR	-3.1671		0	0	0000	0
:0517	TK2IPH	TK2	VIPPS2	HEE	TOR	-9.9979		0	0	0000	0
:0518	MD2IV	RF2	MOD	INPUT	VLTS	V	0.0024	2.8296	0	0400	0
:0519	MD2OV	RF2	MOD	OUTPUT	VLT	KV	0.0275	20.145	0	0400	0
:051A	MD2OI	RF2	MOD	OUTPUT	CUR	A	0.3052	171.2	0	0400	0
:051B	DR2SV	RF2	DR	SCREEN	VOLT	V	3.2959	507.08	24.902	0400	0
:051C	RF2HV	RF2	HI	VLTS	ONOFF	KV	0.0366	0	0	0400	0
:051D	RF2PAI	RF2	7835	FIL.	CURR	A	6742.2	6747.1	50.659	0400	0
:051E	DR2PAV	RF2	4616	FIL.	VOLT	V	0.8441	0	0	0000	0

**Command file**

The source code files are:

SYSTEM.SA     System routines glue

EDAD.SA       Pascal Analog Descriptor application

CVGN.SA       Numeric conversion—floating pt to ascii

UPPERCAS.SA     Adjust text string to upper case

There are about 1000 lines of source in EDAD.SA. The total size of the application is about 9K bytes.